

## Operating Tips for Digital Voice Using *FreeDV*

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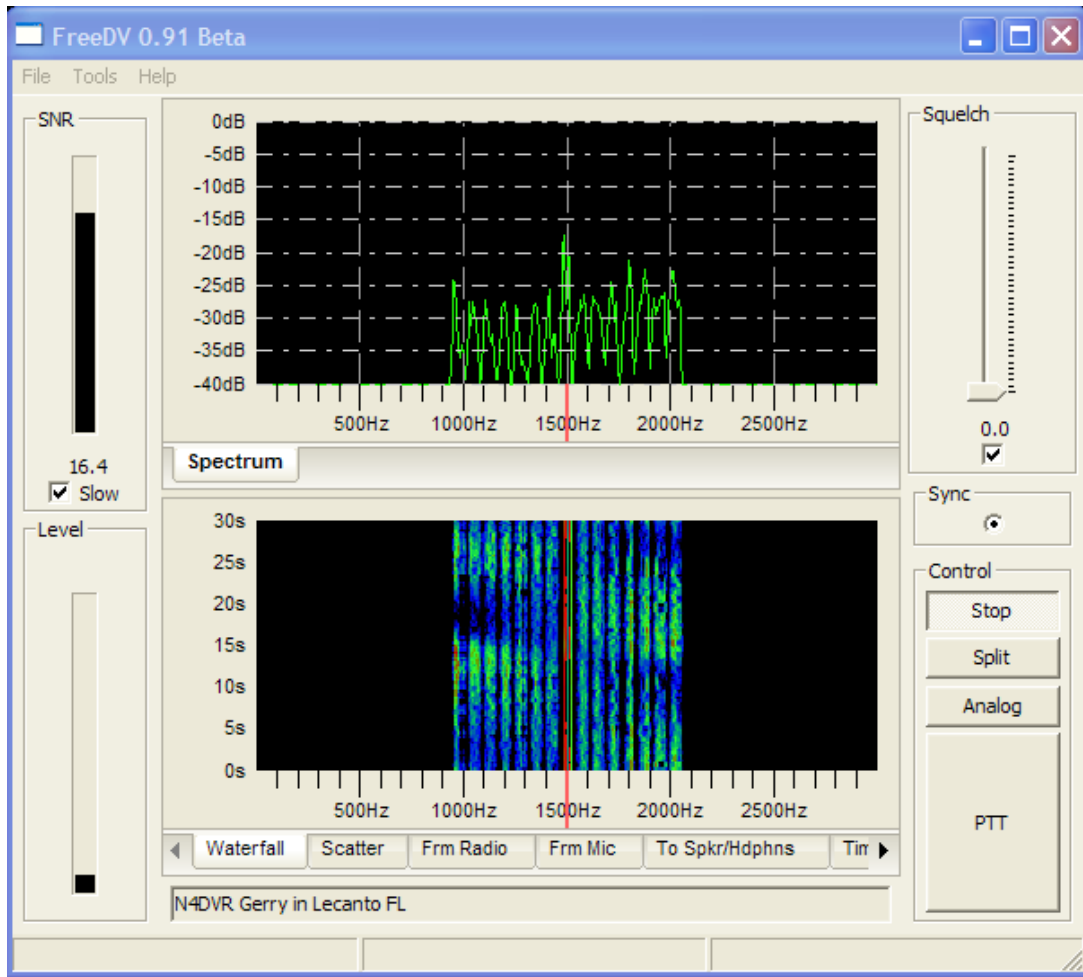
The following are guidelines for configuring and using *FreeDV* on the HF bands. Written and video setup guides are available at <http://freedv.org>. Log in to the *FreeDV* QSO Finder at <http://qso.k7ve.org>.

### Configuration:

- Use the internal/motherboard sound card for the radio in/out data (same as PSK31).
- Use a USB headset for microphone/speaker or USB audio adapter/dongle with “PC” mic and powered speakers. Adapters should use the “C-Media” codec.
- Start by adjusting sound card/USB audio dongles/headset mixer levels to ¼ scale using the mixer associated with each sound device. In Windows OS, select the Playback (Volume/Wave slider) and then Playback (Record slider) for each sound device.
- Keep the “Set Call Sign” text box short as possible. Add only your call, name and location.

### Receive adjustments:

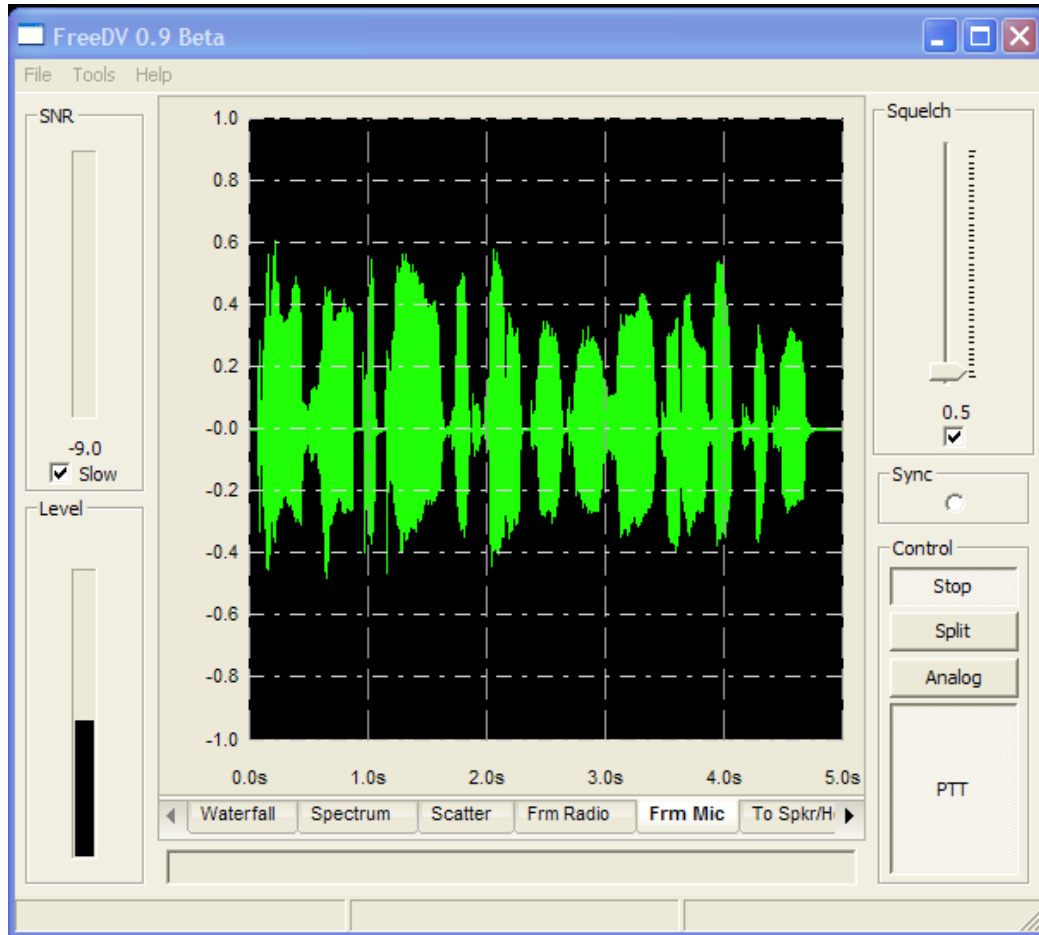
- Using the Squelch slider, adjust to 0.0. Squelch will still function but with highest sensitivity and allow decoding during fast fading of the signal.
- Adjust the Waterfall audio level to display a “blue” color with no *FreeDV* signal present. Normally, the RF/AGC gain will be backed off approximately 30%. Then adjust the RF/AF gain to obtain the highest SNR with a *FreeDV* signal present. The sound card mixer Record level slider also affects the audio level to the *FreeDV* decoder. Excessive drive will trigger a red warning indicator. When using the Spectrum display, adjust level of carriers so they do not exceed 80% of full scale.



The *FreeDV* interface showing typical waterfall (with some fading) decoding a digital voice signal.

### Transmit adjustments:

- Adjust a typical 100 watt transceiver output to approximately 25 watts out (no ALC action).
- Adjust microphone level to show maximum peak deflection of  $\pm 0.6$  with average around 0.4.
- Close-talk the microphone while making the final level adjustment. Any non-speech input (such as fan noise or RFI) will be decoded as “noise.” No deflection should be observed on the baseline of the transmit display with no speech input.
- Make a transmit/receive sound card loop-around connection (From Microphone to Speaker/Headphone) and listen to the DV decoded audio while speaking into the mic. Adjust for best voice quality using *FreeDV*'s mic equalizer found under “Tools.”



**The *FreeDV* interface in transmit mode showing the analog modulation peaks from the microphone prior to encoding for DV.**

**What to expect:**

- Expect good voice decoding with the SNR readings above 6 dB. Due to fading over an HF channel caused by multipath signals arriving at the antenna, the SNR can rapidly fluctuate over a wide range. S9 signals with low distortion will peak to 19 dB or better providing a good cushion for deep fades (shown as black areas or “notches” in the waterfall).
- Once receive signal is in sync with the transmitting station (black dot in radio bullet indicator), no additional tuning is required. The BPSK (looks like a PSK31 signal in the waterfall) will sync within  $\pm 200$  Hz of the transmitter signal. Left click on the display at 1500 Hz to center the signal within the display.
- Decoding may improve with fast or no AGC. Turn off any transmitter equalization, DSP, noise limiter/noise reduction that normally may be on in SSB mode.
- Ensure the transceiver’s SSB microphone is not “live” when in transmit.